※ 考生請注意：本試題 ☑可　□不可 使用計算機

1. A twisted-pair line has a channel bandwidth of 1 MHz, and its cable loss is 3dB/km, Assume the transmit power is 1W, and the distance between the transmitter and receiver is 10 km. The noise is -40dBm at the transmitter site and -30dBm at the receiver site. Find the transmission capacity of the channel by using Shannon theory. (20%)

2. A continuous-wave beacon transmitter is located on a satellite in geostationary orbit. The beacon's 12 GHz output is monitored by an earth station positioned 40,000 km from the satellite. The satellite transmitting antenna is a 1m dish with an aperture efficiency of 70 percent, and the earth station receiving antenna is a 10m dish with an aperture efficiency of 55 percent. Calculate the received power, given that the beacon's output power is 100 mW. (20%)

3. Consider the (31, 15) Reed-Solomon code.
   (a) How many bits are there in a symbol of the code? (5%)
   (b) What is the block length in bits? (5%)
   (c) What is the minimum distance of the code? (5%)
   (d) How many symbols in error can the code correct? (5%)

4. A speech signal has a total duration of one hour. It is sampled at the rate of 8 kHz and then encoded. The signal-to-(quantization) noise ratio is required to be 40 dB. Calculate the minimum storage capacity needed to accommodate this digitized speech signal. (20%)

5. A direct-sequence spread binary PSK system uses a feedback shift register of length 19 for the generation of the PN sequence. Calculate the processing gain of the system. (20%)